ACTIVITY 4: TEMPERATURE & YEAST GROWTH

Many bread recipes call for yeast to help the bread rise. The yeast consumes the sugars in the bread mixture and produce carbon dioxide, the same gas that people exhale, that gets trapped in the bread forming little bubbles and puffing up the bread, or helping it to rise.

Are there better conditions, such as an optimal temperature, for yeast to cause bread to rise? The purpose of this activity is for students to investigate the effect that temperature has on the growth of a single-celled fungi—yeast.

Begin by demonstrating to students that dry yeast, when mixed in a sugar-water solution, will eat the sugar and produce carbon dioxide. Have a container with dry yeast alone in it and another with yeast that has been in a warm sugar water solution for a while—but do not reveal the temperature of the water you used.

Materials Needed:

- Active dry yeast packets
- Beakers or tall, clear glass drinking cups
- Water
- Granulated sugar
- A heating element (e.g., a hot plate or microwave)
- Thermometer
- Ruler
- Stopwatch, clock with second hand, or timer

First, inform students that they will be working with a partner to test the effect of temperature on yeast growth.

Then, provide students the supplies they'll need to conduct the experiment. Explain that all groups will be testing the same factor—temperature—but each group will formulate their own hypothesis and choose three different temperatures to test on their yeast.

Next, give students time to plan out how they are going to test the effect of temperature on yeast growth. Guide them to consider choosing three different temperatures but the same amount of water, yeast, and sugar. When the yeast grows it will take the container's shape.

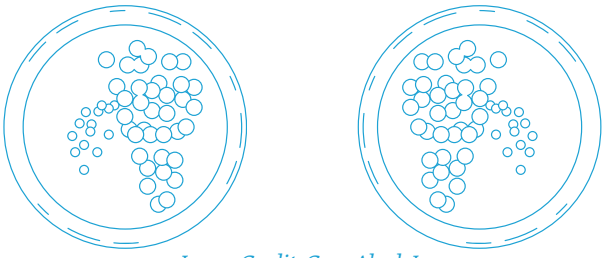

Image Credit: Gary Abud, Jr.

Because the containers are roughly the shape of a cylinder, help students to realize that one way to measure the growth of the yeast would be to compare the volume of yeast after a certain amount of time. They can estimate the volume of the yeast based on the height of the cylindrical column it forms using the cylinder volume formula:

$$V = \pi r^2 h$$

This would allow them to easily compare the amount of yeast growth between the containers of different water temperatures.

Last, have students organize their results in a data table, chart, or graph. The can display their findings and conclusions (e.g., did their data support their hypothesis or not) in a poster presentation using large dry erase boards, chart paper, or a digital slidedeck-making tool.

After the reports are finished, allow time in class for students to share and discuss their results with one another. Facilitate a group discussion to help the group arrive at consensus about what the ideal temperature might be to support yeast growth. Consider asking follow-up questions during the discussion to help students make further connections between their experiment and prior learning, such as:

- Could there be such a thing as too high a temperature for yeast? Why might that be?
- How might our findings here inform baking recipe procedures?
- What do the effects of temperature on yeast reinforce for us about the conditions that organisms need to live?
- Why does the yeast need to stay dry?